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RESULTS OF SURVEY ON USE OF

DTNSRDC FORTRAN LIBRARIES

by

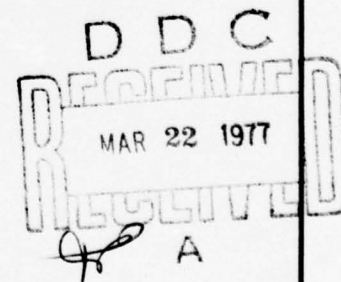L. Kenton Meals
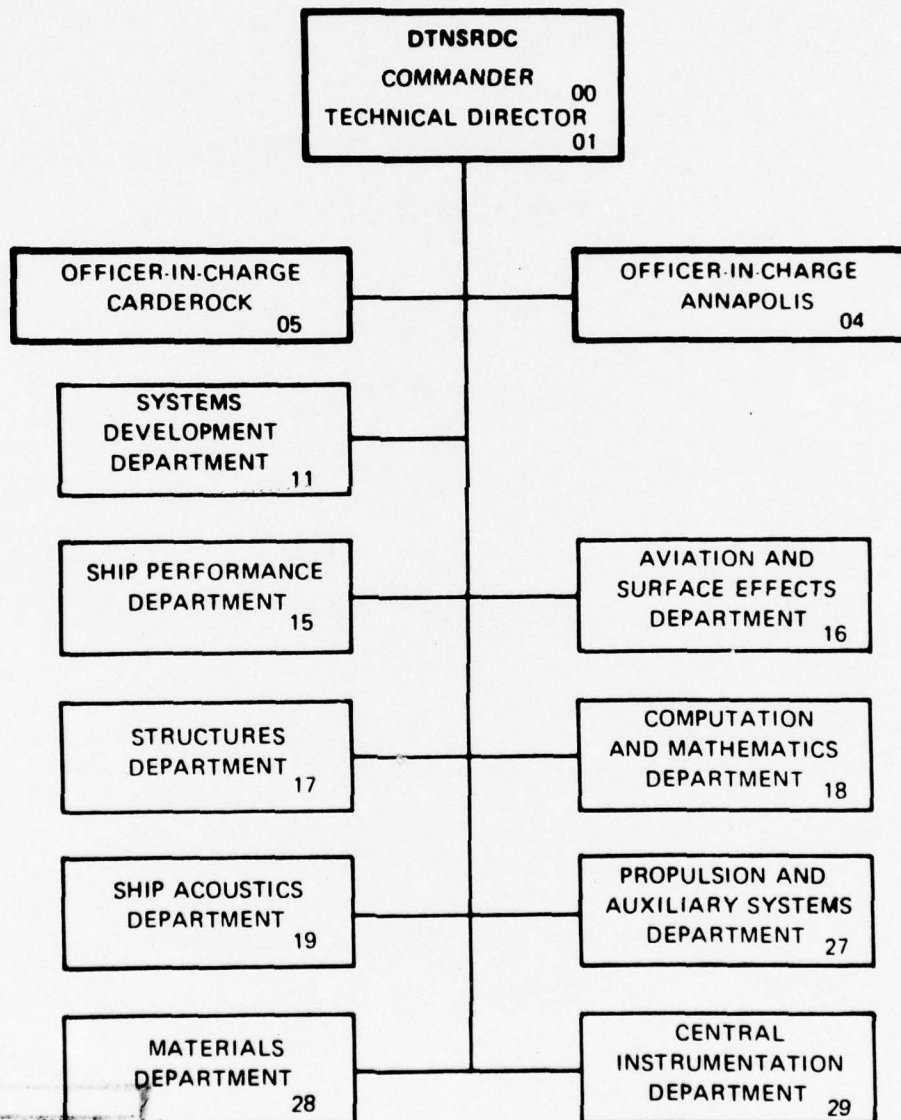
COMPUTATION AND MATHEMATICS DEPARTMENT

DEPARTMENTAL REPORT

July 1976   CMD-09-76

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Use of the Fortran subroutine libraries at DTNSRDC was surveyed to determine to what extent the leased proprietary libraries were being used, to get user reaction to a proposed automated subroutine information system, and to discover any other information that might lead to improved library service. In general the leased libraries are most heavily used, reaction to the information system is favorable, and the existing library service is acceptable.

TABLE OF CONTENTS

I. INTRODUCTION

A survey was conducted in July 1974 of the users of the CDC-6000 system at the David W. Taylor Research and Development Center to get a profile of Fortran subroutine library use, to determine to what extent the leased proprietary libraries were being used, to get user reaction to a proposed automated subroutine information system, and to discover any other information that might lead to improved library service.

Almost 1500 questionnaires were mailed out. Some of these mailings turned out to be undeliverable and, upon being returned, were used to update the mailing list. Of the others, 128 were filled out and returned. Among the 128, 70 were from Fortran users. This report is a summary and analysis of the 70 responses.

II. DESCRIPTION OF THE SURVEY

A. BACKGROUND

As part of an effort to assure that the most reliable numerical methods and the most efficient subroutines would be used on the CDC-6000 system at DTNSRDC, two proprietary Fortran libraries were leased. These libraries are certified and maintained by International Mathematical and Statistical Libraries, Incorporated, and Control Data Corporation, respectively. A computer-based subroutine information system was conceived and a prototype was designed and implemented using the contents of these two libraries as an initial data base.

1

The questionnaire was planned and prepared primarily to get reaction from the community of DTNSRDC computer users to the leased libraries and to the computer-based library information system. It was reviewed and modified by designers for the subroutine information retrieval system together with representatives of the User Services Branch of the Computer Facilities Division in order that their interests might be served.

B. DESCRIPTION OF THE QUESTIONNAIRE

The questionnaire consisted of three sections. The first section served to screen the users into Fortran and non-Fortran types. Only those interested in Fortran applications were requested to complete the remaining two sections.

The second section surveyed current library use. It attempted to quantify the use of all major subroutine packages available at DTNSRDC to determine the frequency of use with respect to the number of programs containing a subroutine of the package and the number of computer runs per month of programs containing subroutines from the package. This section also addressed the questions of identifying subroutines most important to on-going applications, determining the impact of the proprietary libraries on current work, discovering subroutines that might be added to enhance the libraries, ascertaining to what extent the users consider the current libraries to be adequate, and soliciting comments and suggestions on the utility of the current libraries.

The third section was directed toward sampling user reaction to the proposed subroutine information system by determining projected frequency of use and soliciting useful comments. A brief description of the Subroutine

2

Information System was attached to the questionnaire. A copy of the complete survey letter with enclosures is included as Appendix A of this report.

III. SUMMARY OF RESPONSES

As reported in the introduction, there were 128 responses. The distribution of these responses turned out to be fairly representative of the user community. A breakdown of the representation is provided in Table 1.

TABLE 1 - DISTRIBUTION OF RESPONSES TO QUESTIONNAIRE

Source of Response	Number of Responses			Approx. No. of Surveys Mailed Out
	Fortran Users	Non-Fortran Users	Total	
Comp & Math Dept - DTNSRDC	22	8	30	250
Other DTNSRDC Departments	30	30	60	700
Other Navy Agencies	16	19	35	400
Other Gov't Agencies and Contractors	2	1	3	150
TOTAL	70	58	128	1500

The non-Fortran users were not asked to complete the questionnaire. The sample of the user population on which the summary of results is based therefore consists of the 70 Fortran users who completed the questionnaire.

The library subroutines most frequently occurring in programs and also run most frequently were subroutines from the proprietary Mathematical Subroutines Library Package (MSL), the proprietary International Mathematical and Statistical Library Package (IMSL), and the non-proprietary Biomedical Library (BIMED). A complete record of the responses on current library useage is given in Table 2 on the following page.

TABLE 2 - CURRENT LIBRARY USAGE

Subroutine Package	Number of Programs Using Package		Computer Runs Per Month Using Subroutines from Package		
	1-10	11-50	1-10	11-50	51-100
IMSL	11	0	5	4	0
MSL	11	0	9	2	0
Eispack	2	0	0	0	0
BMD	12	0	7	3	0
SSP	6	0	4	1	0
CMD	4	1	3	1	1
VIM	2	0	0	1	1
SHARE	6	0	2	2	0
Other	6	3	3	5	1

In response to the question of whether the present library met their needs, approximately 44 percent said that it did, 3 percent said that it did not, and 22 percent said that it only partially satisfied their needs. The remaining 31 percent gave no answer.

Fifty-four percent of the Fortran users said that discontinuation of the IMSL and MSL leased libraries would have no effect on their work, 18 percent said that it would have a mild effect, and about 4 percent said that the effect would be serious. Approximately 21 percent made no reply to this question.

The subroutines considered most important to the work of the responding users were predominately statistical. Approximately three times as many statistical subroutines were mentioned as the next most frequent category which was matrix/linear algebra routines. The third most frequently mentioned category was plotting. Others mentioned in order of frequency were data fitting, utility, special function and basic elementary functions.

A brief description of the proposed computer-based subroutine information retrieval system was attached to the questionnaire to facilitate response to the questions concerning it. Fifty-one of the questionnaires received included some indication of extent of anticipated use of this system if it should be established. Of these, more than half anticipated using it at least once a month. Only six people did not expect to use it. A more detailed summary of anticipated use of the information system is included in the tally of responses given in Appendix B.

Comments on the subroutine information system were varied and ranged from enthusiastic support to mild opposition. However, almost all of the comments agreed in expressing the desirability of having more accurate and complete information on the subroutines that can be used on the CDC-6000 systems at DTNSRDC readily and are easily accessible to users of the system.

IV. COMMENTS ON RESPONSES

The relatively small number of questionnaires returned (less than ten ppercent of those mailed out) may not be attributable entirely to the common apathy toward responding to surveys. The survey mailing was delayed, thus reducing the response interval; indeed, in some cases the questionnaires were actually not received until after the deadline had passed. Moreover, the mailing list included everyone who had registered user initials, even those having no interest in writing programs and those interested exclusively in management data processing.

Although it is difficult to estimate what percentage of the addressees made up the intended population to be sampled, the fact that the distribution of responses received was roughly the same as the distribution of users over the community of users, as shown in Table 1, indicates that a reasonably reliable sample of the user population was reached.

The current library usage included all the major libraries listed. The usage of the proprietary libraries indicates some recognition of their quality both in programs and in documentation and their ease of use.

However, the degree of usage also indicates that these libraries are not fully exploited. This may be due partly to resistance to change, but also may very well be a result of unawareness of the content and quality of these libraries. The interest in the BMD statistical routines may be due partly to their long-standing reputation and continuous use over many years. Statistical applications are not confined to the BMD package, however. Some of the users of the IMSL library have indicated that their primary interest was in the statistical subroutines.

Subroutines considered most important in the work of the users were predominantly statistical programs, matrix routines, and plotting routines, but were not limited to these. Some of the questionnaires were very specific in identifying the routines, while others were quite general.

V. CONCLUSIONS

1. A representative sample of Fortran subroutine users was tested.

2. The IMSL, MSL, and BMD libraries are most heavily used.

3. The impact of removal of the IMSL and MSL proprietary libraries
   is sufficient to justify the retention of both.

4. The present library largely meets the requirements of the users,
   but information on the contents of the library should be made more
   readily accessible.

5. If an on-line subroutine information retrieval system were to become
   available, more than 80 percent of the Fortran users would make use
   of it to some extent.

APPENDIX A

COPY OF THE COMPLETE MAILING

COVERING LETTER

1842:LKM:ahc
3 JUN 1974

MEMORANDUM

From: Mathematical Subroutine Library Project, Code 1842, NSRDC
To: Distribution List

Subj: Request for input to plans relating to the NSRDC FORTRAN Subroutine Library

Encl: (1) Questionnaire for Users of NSRDC FORTRAN Subroutine Libraries
(2) Description of Planned Subroutine Information System

1. In order to make the FORTRAN subroutine libraries available on the NSRDC computers more accessible and useful, a computer-based Subroutine Information System which will provide ready access to information about contents of the FORTRAN libraries is being planned.

2. We will appreciate your help in guiding this effort through your response to the questionnaire in enclosure (1). A brief description of the planned Subroutine Information System (enclosure (2)) is provided for your information.

3. Please return the completed questionnaire to USER SERVICES, Code 1892.1, NSRDC, by 30 June 1974.

L. KENTON MEALS

QUESTIONNAIRE

To: NSRDC Code 1892.1

From: Name _____

       Installation & Code _____

       Telephone No. _____

       Date _____

       Representing _____

       Questionnaire for Users of NSRDC FORTRAN Subroutine Libraries

A. Do you use FORTRAN programs on the NSRDC Computer System?

              |‾| Yes |‾| No

If your answer is no, ignore the remainder of the questionnaire.

B. Current Library Usage

    1(a) How many of your programs use subroutines from each of the following libraries?

    (b) Roughly how many computer runs do you make per month using these programs?

		0	1-10	11-50	51-100	over 100
IMSL (CLIBINTERMATHSTAT)	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
MSL (CLIBMATHSTAT)	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
NON-PROPRIETARY						
EISPACK	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
BMD	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
SSP	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
CMD	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
VIM	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
SHARE	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐
OTHER (please identify)	(a)	☐	☐	☐	☐	☐
	(b)	☐	☐	☐	☐	☐

2. Which subroutines do you consider most important in your work?
    (Give name of subroutine and library or other source)

      (1)

      (2)

      (3)

      (4)

      (5)

3. What would be the impact on your work if either of the following
proprietary libraries were no longer available?

	No effect	Mild effect	Serious effect	Disastrous effect
IMSL	|‾|	|‾|	|‾|	|‾|
MSL	|‾|	|‾|	|‾|	|‾|

4. Identify any FORTRAN subroutines not in the NSRDC libraries that you
think should be included.

      <u>Name</u>   <u>Source (if available)</u>

5. Does the present library meet your needs? Yes __ No __ Partly __
What inadequacies have you found in its content or quality?

6. Please make any further comments or suggestions regarding current
library utility.

C. Subroutine Information System (see Encl. (2))

    1. If such a retrieval system were available how often would you use it?

    |⎯| once/wk. |⎯| once/mo. |⎯| once/yr. |⎯| not at all

    2. Please make any further comments or suggestions you consider useful to the development of the Subroutine Information System.

DESCRIPTION OF PLANNED SUBROUTINE INFORMATION SYSTEM

1. The SHARP information storage and retrieval system will be used in conjunction with a data bank containing descriptions of the NSRDC mathematical subroutine libraries.

2. Batch and Teletype users of the CMD 6000 computer systems will be able to access the data bank to retrieve information on what subroutines are available in each category and subcategory, with selected information about such subroutines.

3. Routines will be assigned a 2-character code. The first character is a letter (A,B,...,Z) indicating a category; the second character is a digit (0,1,...,9) indicating a subcategory within the category. Thus, for example,

> [B0 Elementary Functions] is a category and

> [B2 Hyperbolic] is a subcategory of the category Elementary
> Functions.

4. Descriptions of individual routines will contain:

A. Name of Routine

B. SubCategory

C. Mini-Description: one or two sentences giving purpose, function, capability. The user may list routines under a subcategory.

> (e.g. B - Elementary Functions - Category
>
>   B1 - Trigonometric Functions - Subcategory
>
>   Routine name - Mini description)

D.* Abstract - expanded mini-description and references.

E.* Calling Sequence - for subprograms, or if abstract of a main program, then would indicate the needed input data.

F.* Description of Parameters

G.* Restrictions - other routines needed, mathematical restrictions, core requirements, etc.

H.* Recommendations - test cases - comparisons, accuracy, timing, routines more desirable, etc.

I. Library Type - source library, e.g., IMSL, MSL, EISPAK, etc.

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* Initially not included in the system.

Enclosure (2)

14

APPENDIX B

TALLY OF RESPONSES

A. FORTRAN Users   70
   Non-FORTRAN Users   58

B. CURRENT LIBRARY USAGE

   1. a) Number of programs using subroutines from each library

       b) Number of computer runs per month using these programs

PROPRIETARY	(a) 1-10	11-50	(b) 1-10	11-50	51-100
IMSL	11		5	4	
MSL	11		9	2	

NON-PROPRIETARY					
EISPACK	2				
BMD	12		7	3	
SSP	6		4	1	
CMD	4	1	3	1	1
VIM	2			1	1
SHARE	6		2	2	
Other	6	3	3	5	1

B3 Impact if these proprietary libraries were no longer available

	None	Mild	Serious
IMSL	38	11	3
MSL	38	13	2

B5 Present Library

Meets needs	31
Partly meets needs	15
Does not meet needs	2

C. Would use subroutine information retrieval system

Once a week	8
Once a month	20
Once a year	17
Not at all	6

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